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FORM PTO-1390 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NUMBER: 98.1067 US <div style="border: 1px solid black; padding: 2px; display: inline-block; font-weight: bold; font-size: 1.2em;">09/857789</div> <small>U.S. APPL. NO. (If known, see 37 CFR 1.5)</small>
INTERNATIONAL APPLICATION NO.: PCT/NL99/00756	INTERNATIONAL FILING DATE: 9 DECEMBER 1999 (09.12.99)	PRIORITY DATE CLAIMED: 9 DECEMBER 1998 (09.12.98)
TITLE OF INVENTION: TELECOMMUNICATION SYSTEM AND CONNECTION DEVICE FOR USE IN IT		
APPLICANT(S) FOR DO/EO/US: Jacobus Petrus Maria PENNINGS and Edwin Robert OTTER		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
1. <input checked="" type="checkbox"/>	This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.	
2. <input type="checkbox"/>	This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.	
3. <input checked="" type="checkbox"/>	This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).	
4. <input checked="" type="checkbox"/>	A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.	
5. <input checked="" type="checkbox"/>	A copy of the International Application as filed (35 U.S.C. 371(c)(2))	
a. <input checked="" type="checkbox"/>	is transmitted herewith (required only if not transmitted by the International Bureau).	
b. <input checked="" type="checkbox"/>	has been transmitted by the International Bureau. (see attached copy of PCT/IB/308)	
c. <input type="checkbox"/>	is not required, as the application was filed in the United States Receiving Office (RO/US).	
6. <input type="checkbox"/>	A translation of the International Application into English (35 U.S.C. 371(c)(2)).	
7. <input type="checkbox"/>	Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).	
a. <input type="checkbox"/>	are transmitted herewith (required only if not transmitted by the International Bureau).	
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c. <input type="checkbox"/>	have not been made; however, the time limit for making such amendments has NOT expired.	
d. <input type="checkbox"/>	have not been made and will not be made.	
8. <input type="checkbox"/>	A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).	
9. <input type="checkbox"/>	An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).	
10. <input type="checkbox"/>	A translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).	
Item 11. to 16. below concern document(s) or information included:		
11. <input type="checkbox"/>	An Information Disclosure Statement under 37 CFR 1.97 and 1.98.	
12. <input type="checkbox"/>	An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.	
13. <input checked="" type="checkbox"/>	A FIRST preliminary amendment.	
14. <input type="checkbox"/>	A SECOND or SUBSEQUENT preliminary amendment.	
15. <input type="checkbox"/>	A substitute specification.	
16. <input checked="" type="checkbox"/>	A change of power of attorney and/or address letter.	
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PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Jacobus PENNINGS et al.

Serial No. (unknown)

Filed herewith

TELECOMMUNICATION SYSTEM AND CONNECTION DEVICE FOR USE IN IT

PRELIMINARY AMENDMENT

Commissioner for Patents

Washington, D.C. 20231

Sir:

Prior to the first Official Action and calculation of the filing fee, please substitute pages 1-16 of the current specification, with new pages 1-15 as filed in the Article 34 Amendment of December 22, 2000. The new specification pages are marked "AMENDED SHEET", and are attached hereto.

Prior to the first Official Action and calculation of the filing fee, please substitute Claims 1-18 as originally filed, which appear on pages 17-19, with Claims 1-17 as filed in the Article 34 amendment of December 22, 2000. The pages containing Claims 1-17 are marked "AMENDED SHEET" and are attached hereto. Following the insertion of Claims 1-17, please amend these claims as follows:

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IN THE CLAIMS:

Please amend claims 3, 5, 8, 11, 14-15 as follows:

--3.(Amended) Connection device as claimed in claim 1, characterized in that the separation means comprise frequency filter means adapted to directing both telecommunication signals over their respective signal paths.--

--5.(Amended) Connection device as claimed in claim 1, characterized in that the second telecommunication means are moreover capable of receiving a first telecommunication signal in a first frequency range and in that the device comprises at least one further output being intended for the second telecommunication means.--

--8.(Amended) Connection device as claimed in claim 5, characterized in that at least the output for the second telecommunication means is electrically insulated for a direct current.--

--11.(Amended) Telecommunication system as claimed in claim 9, characterized in that the system moreover comprises digital third communication means, in that the second telecommunication means comprise signal conversion means which are coupled to an input and an output of the connection device on the one hand and to said third telecommunication means on the other hand and in that the conversion means are capable of

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converting digital signals from the third telecommunication means into a communication signal compatible with the telecommunication network, and vice versa.--

--14.(Amended) Telecommunication system as claimed in claim 12, characterized in that the gateway unit is adapted to communicating with the conversion means using a telecommunication protocol which allows the integration of different telecommunication services.--

--15.(Amended) Telecommunication system as claimed in claim 11, characterized in that the third telecommunication means are coupled to a digital further telecommunication network, which further network is coupled to the input and output of the connection device via said conversion means.--

R E M A R K S

The above changes in the specification and claims merely place this national phase application in the same condition as it was during Chapter II of the international phase, with the multiple dependencies being removed. Following entry of this amendment by substitution of the pages, only claims 1-17 remain pending in this application.

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Specification pages 1-16 have been substituted with new specification pages 1-15. Claims 3, 5, 8, 11 and 14-15 have been amended to correct multiple dependencies. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

Respectfully submitted,

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June 11, 2001

"VERSION WITH MARKINGS TO SHOW CHANGES MADE"

Claims 3, 5, 8, 11 and 14-15 have been amended as follows:

3. (Amended) Connection device as claimed in claim 1 ~~or~~ 2, characterized in that the separation means comprise frequency filter means adapted to directing both telecommunication signals over their respective signal paths.

5. (Amended) Connection device as claimed in ~~one or more of the preceding claims, claim 1,~~ characterized in that the second telecommunication means are moreover capable of receiving a first telecommunication signal in a first frequency range and in that the device comprises at least one further output being intended for the second telecommunication means.

8. (Amended) Connection device as claimed in claim 5, ~~6 or 7,~~ characterized in that at least the output for the second telecommunication means is electrically insulated for a direct current.

11. (Amended) Telecommunication system as claimed in claim 9 ~~or 10,~~ characterized in that the system moreover comprises digital third communication means, in that the second telecommunication means comprise signal conversion means which are coupled to an input and an output of the connection device on the one hand and to said third telecommunication means on the other hand and in that the conversion means are capable of converting digital signals from the third telecommunication means into a communication signal compatible with the telecommunication network, and vice versa.

14. (Amended) Telecommunication system as claimed in claim 12 ~~or 13~~, characterized in that the gateway unit is adapted to communicating with the conversion means using a telecommunication protocol which allows the integration of different telecommunication services.

15. (Amended) Telecommunication system as claimed in claim 11, ~~12, 13 or 14~~, characterized in that the third telecommunication means are coupled to a digital further telecommunication network, which further network is coupled to the input and output of the connection device via said conversion means.

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Telecommunication system and connection device for use in it

The present invention relates to a telecommunication system comprising first telecommunication means capable of receiving a first telecommunication signal in a first frequency range, second telecommunication means capable of transmitting a second telecommunication signal in a second frequency range, and a telecommunication network. The invention further relates to a connection device for coupling first telecommunication means capable of receiving a first telecommunication signal in a first frequency range, together with second telecommunication means capable of transmitting a second telecommunication signal in a second frequency range, to a single telecommunication network connection, comprising an output for the first telecommunication means, an input for the second telecommunication means, a common network connection for the telecommunication network and separation means adapted to directing the first telecommunication signal over a first signal path between the output and the common network connection and the second telecommunication signal over a second signal path between the common network connection and the input.

Telecommunication services take place for the most part over tailor-made telecommunication networks. Use is thus predominantly made for speech transfer of public telephone networks, referred to as PSTN (Public Switched Telephony Network), and for data exchange between computers numerous data networks specifically designed for this purpose are operational. Video and audio signals normally make their way through the ether and, in many industrialized countries, increasingly in cable television networks which are constructed on high-grade transport media such as glass fibre and coaxial cables. A user wishing to make use of all these services will consequently have to have at his disposal a corresponding number of connecting provisions.

The ongoing computerization of society results in ever further extension of existing telecommunication services, or even in the emergence of more and more new telecommunication services, which are moreover increasingly aimed at private users. In addition, these services are increasingly interactive, wherein high data transmission speed is sometimes desirable to enable transmission of large quantities of information to the user in an acceptable time. Examples hereof are forms of telemetry, pay-per-view

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and in particular the internet, which moreover requires an increasingly higher data transmission speed due to the increasing implementation of multi-media applications.

Because the maximum data transmission speeds and the attainable band-width of a public telephone network are increasingly perceived as a limitation in such interactive services, an active search is under way for alternative networks for data transfer. A possible candidate here is the widespread cable television network such as has by now been laid in many industrialized countries. This network is distinguished from the public telephone network in that it is based on a high-grade transport medium right up to the end user which varies from high-grade glass-fibre connections in higher parts of the network to high-grade coaxial cables for connection of subscribers. Such connections offer a markedly greater band-width and allow a markedly higher transmission speed than the public telephone network to which subscribers are connected by means of a simple pair of copper wires twisted together. The integrity of digital signals in such a high-grade network can moreover be more readily guaranteed.

Cable television networks were however designed primarily for the distribution of radio and television programmes, this taking place in one direction from the network to the subscribers. Return traffic from the subscriber to parts located higher in the network, such as the second telecommunication signal from the second telecommunication means referred to in the preamble, was not anticipated in the first instance but is required more and more in present-day telecommunication. In order to make this latter possible, existing cable television networks are increasingly being upgraded and made suitable for two-way traffic. These modifications consist substantially of arranging bypass filters and bypass amplifiers enabling transmission of return signals in parallel to the existing amplifiers in the network. These return signals are herein situated in a relatively low frequency range which is not occupied by the radio and television channels to be distributed and which is troubled less by signal-damping. A problem which occurs here after such a modification of the network is that not only data transmission is possible in the return direction but that noise, referred to as ingress noise, which is also generated at the end user can now enter the network freely and is transmitted in amplified manner.

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Ingress noise originates predominantly from connecting cables used in the home for connecting the equipment present therein. Such cables herein act as antennas which intercept possible electromagnetic disturbances in the home and pass them on to the cable network. This latter is of course undesirable, all the more so because it is precisely the lower frequency bands in which the digital data transport must take place which are relatively susceptible to noise.

Another circumstance is that, with two-way use of a cable television network, it is no longer only receiving appliances such as a radio or television receiver which will be present at an end user but also transmitting equipment for transmitting return signals. If all equipment is simply connected collectively to the existing connecting provision for the cable television network, the return signals of such transmitting equipment will inevitably also flow to the receiving appliances and can interfere with the communication signals intended therefor. Typical transmitting equipment for cable television networks normally has an optimal adjustment for transmitting signals without taking into account the influence thereof on other equipment which may also be present. The output level usually amounts herein to 80-115 dB V. Since television and radio signals are usually adapted to a standardized level of 60-80 dB V, this will rapidly result in a disturbing interference of the received radio and television programmes.

The present invention has for its object inter alia to provide a telecommunication system and a connection device of the type stated in the preamble enabling shared use of a connection of a telecommunication network, while the above described problems are at least for the greater part obviated.

In order to achieve the intended objective a connection device of the type stated in the preamble is according to the invention characterized in that said signal paths are separated from each other between the separation means and the input and output respectively and in that the first signal path comprises rectifier means capable of suppressing signal transport in a direction opposite to that of the first telecommunication signal. The invention is herein based on the recognition that, with an effective separation

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at the user of the signal paths for downstream and upstream communication traffic, mutual interference and also inflow of noise into the network can be prevented. In the connection device according to the invention this means that upstream signal traffic, which will come from the second telecommunication means, is led exclusively over the second signal path, while downstream signal traffic intended for the first telecommunication means finds its way via the first signal path. Both traffic flows are thus separated from each other, so that mutual interference is prevented.

The provision of rectifier means within the first signal path greatly reduces the inflow of noise and other undesired signals into the network. Because the rectifier means largely suppress each signal flow in upstream direction in the first signal path, the entry of ingress noise into the network via the first signal path is effectively prevented. Because the desired return traffic from the second telecommunication means takes place wholly in the separated second signal path, it is not disrupted by the rectifier means. A specific embodiment of the connection device has in this respect the feature according to the invention that the rectifier means comprise an operational amplifier.

A particular embodiment of the connection device according to the invention is herein characterized in that the separation means comprise frequency filter means capable of leading both telecommunication signals over their respective signal paths. By causing the traffic in the two directions in the network to run at least substantially strictly in different frequency ranges, it is possible to provide the intended separation of the two signal paths in comparatively simple manner with such separation means. Such a particular embodiment according to the invention is more particularly characterized in that the frequency filter means comprise a low-pass filter with a edge frequency above a lower one of the first and second frequency range, as well as a high-pass filter with a edge frequency below a higher one of the first and second frequency range, while the edge frequency of the high-pass filter exceeds that of the low-pass filter. The upstream traffic, including the second communication signal, herein preferably takes place in the lower frequency range, while the higher frequency range is allocated for the downstream traffic, such as the first communication signal. The lower frequency bands will still be

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available for return traffic in many existing cable television networks, so that the upstream traffic can take place therein. An additional advantage herein is the lesser signal damping at lower frequencies, so that fewer or less powerful amplifiers have to be arranged in the return path of the network.

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In order to enable interactive services such as internet, telephony and pay-per-view, a further embodiment of the connection according to the invention is characterized in that the device comprises a number of outputs, at least one of which is intended for the second telecommunication means. Making use of this embodiment, outgoing signals from the second telecommunication means will run at least substantially strictly over the second signal path, while incoming signals are led at least substantially strictly over the first signal path. This provides the second telecommunication means with the option of two-way traffic while retaining the advantages of the invention. Transmission of information herein takes place in the second frequency range, while information is received in the first frequency range. As a result of the invention full-duplex two-way traffic is thus possible without disturbing interference of the incoming and outgoing signals. Since considerably more information will normally be received than transmitted, it is recommended to choose a first frequency range which is higher than the second, in view of the greater band-width in that higher range.

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A further preferred embodiment herein has the feature according to the invention that attenuation means are present in a signal path between a first output and a second output. A signal separation is thus effected not only between the input and the output of the device but also between the outputs mutually. Interference from one output to an adjacent output can be effectively suppressed by means of the attenuation means without the useful signal having to be impaired as a result. In this respect a further particular embodiment of the connection device according to the invention has the feature that the attenuation means comprise at least one directional coupler. Such a coupler has an input and at least two outputs, one of which has only a small attenuation and the other a significant one. An effective signal separation can be brought about by placing such elements between successive outputs.

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In a further preferred embodiment the connection device according to the invention herein has the further feature that at least the output for the second telecommunication system is electrically insulated for a direct current. An electrical disconnection of the second telecommunication means is thus achieved in the case of direct current components in the signal supplied thereto via said connection. A possible overvoltage from the network or from the first telecommunication means does not in that case disrupt the second telecommunication means. This is particularly important if the first telecommunication means comprises an older type of television receiver, the chassis of which is in some cases under high voltage. If in this case the network connection in the television receiver is not adequately earthed, this preferred embodiment nevertheless avoids said high voltage having adverse consequences for the second telecommunication means.

In order to enable inter alia present-day, but also future telecommunication services, a telecommunication system of the type stated in the preamble has the feature according to the invention that the first and second telecommunication means are coupled to the telecommunication network via an above specified connection device according to the invention. The telecommunication network can herein be in principle any random existing or future network, but in a particular embodiment according to the invention comprises a cable television network intended for distribution of radio and/or television programmes, wherein the first telecommunication means comprise a radio receiver and/or a television receiver. As already stated above, such a network generally offers an exceptionally high-grade infrastructure allowing large data flows and having low distortion.

A particular embodiment of the telecommunication system according to the invention is characterized in that the second telecommunication means comprise conversion means coupled on the one hand to an input and an output of the connection device and coupled on the other to digital third telecommunication means. The conversion means are capable of converting digital signals from the third telecommunication means into a communication signal compatible with the telecommunication network, and vice versa.

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It is hereby possible to include digital third telecommunication means in the telecommunication system even though the network would not directly allow this, for instance because it is analog or employs different signal frequencies. Examples of such digital telecommunication means are computers, digital telephone devices and diverse devices intended for many forms of telemetry and remote-control.

It is generally desirable to be able to use commercially obtainable telecommunication means in a telecommunication system without having to modify the telecommunication means. The system can hereby be employed more universally and there is less danger of disturbances in the equipment to be connected. With this in mind, a particular embodiment of the telecommunication system according to the invention has the feature that a gateway unit is coupled between the third telecommunication means and the conversion means and that the gateway unit has on the one hand a connection with or without an associated interface and specifically adapted to the type of third telecommunication means, and on the other is suitable for communication with the conversion means. The gateway unit in this case provides possible necessary adjustments between the third telecommunication means on the one hand and the conversion means on the other and also provides a standard connection for the third telecommunication means. The third telecommunication means themselves thereby generally require no further modification in order to be incorporated in the system.

A further particular embodiment of the telecommunication system is characterized in this respect in that the gateway unit is suitable for connection of third telecommunication means taken from a group of a computer in a network or stand-alone, means for analog or digital telephony and means for communication over a standard RS 232 serial port. In its most comprehensive form the gateway unit has available all of these connections and the interfaces possibly required therefor, so that a wide diversity of standard telecommunication equipment can be directly connected thereto. In order here to economize on specific interfaces, a further embodiment has the feature that the gateway unit is capable of communicating with the conversion means using a telecommunication protocol which allows the integration of different

5 A further embodiment has the feature according to the invention that the third telecommunication means are coupled to a local digital telecommunication network, which further telecommunication network is coupled to the input and output of the connection device via the conversion means. Adding this digital network enables digital protocols and digital telecommunication services to be offered therein which may
10 possibly not be supported by the primary network. The conversion means herein provide the required conversion between both networks. A hybrid telecommunication system is thus obtained which is based on the one hand on a primary network with a high-grade infrastructure in which two-way signal traffic is possible owing to the invention, and on the other hand a local network which supports at the user the diverse telecommunication
15 services which are desired there.

figure 1 shows a schematic view of a telecommunication system as according to an embodiment of the invention;

figure 2 shows a schematic view of a first embodiment of a connection device according to the invention as used in the telecommunication system of figure 1; and

figure 3 shows a schematic view of a second embodiment of a connection device according to the invention which can be used in the telecommunication system of figure 1.

30 The telecommunication system of figure 1 comprises an existing cable television network 1 primarily intended for transmission and distribution of radio and television

programmes. Coupled to the network are first telecommunication means in the form of a radio receiver 11 and a television receiver 12. Situated for this purpose at the subscriber is a central, common connection 2 for network 1, from which is branched a specific combination connection 3 for radio and television. Such a network is usually designed for distribution of signals in discrete frequency bands typically lying in a range of 5 MHz-862 MHz, and the radio and television receiver are therefore suitable for receiving a first telecommunication signal in a frequency range within these limits. The range of 87.5-108 MHz is for instance occupied for distribution of radio programmes, while the range of 115-862 MHz is allocated for television programmes.

The region below 87.5 MHz is therefore still free and is increasingly being used to have return traffic take place therein, i.e. signal traffic from the subscriber to parts located higher in the network. In this case telecommunication means will also be present at the subscriber, such as the conversion means 21, decoder 34, computers 31, digital telephone handsets and/or analog telephone apparatus 33 as shown in the figure, which are capable of transmitting a second telecommunication signal, the return signal, in this second frequency range. The option of return traffic thus opens the way to numerous interactive telecommunication services over network 1, but also holds the danger for the passage of noise and other disturbances from the subscriber into the network, usually referred to as ingress noise. A return signal generated at the subscriber will moreover be able to interfere with the first telecommunication signal for the receiving equipment if both are supplied to this equipment.

In order to avoid this, the receiving first telecommunication means 11,12 and the transmitting telecommunication means 21,31,32,33,34 are connected according to the invention via a connection device 40 according to the invention as shown in more detail in figure 2. Connection device 40 comprises a common connection 41 for connection to the network 1, an output 42 for the receiving first telecommunication means 11,12 and an input for transmitting second telecommunication means 21 which are optionally present. In accordance with the invention the connection device 40 comprises separate signal paths 44 respectively 45 to output 42 and input 43, which paths are coupled to the

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common connection via separating means 460. Separating means 460 comprise a high-pass filter 461 through which the first communication signal is led over only the first signal path 44, in combination with a low-pass filter 462 which urges the second communication signal over the second signal path 45. In this case both filters are
5 integrated into a single component, designated a duplex filter, of more than -60 dB, although this is not essential per se to the invention.

Because both signals follow at least substantially strictly their own signal path, interference between the two is effectively prevented. This implies among other things
10 that a return signal continuing on its way from input 43 via second signal path 45 cannot appear at an output 42 of the connection device to which receiving appliances 11,12 are coupled. The output of the second telecommunication means can therefore be increased within reasonable limits without the danger of interference of radio and television programmes, which are anyway provided at least substantially strictly via first signal
15 path 44 to the radio and television receiver. The output of the transmitting telecommunication means can thus be freely optimized so as to obtain a high-quality output signal without therein making concessions to the quality of the signal being received by the receiving telecommunication means.

20 The separation of the two signal paths 44,45 in connection unit 40 such that for the analog signal traffic downstream only the first signal path 44 is used and the digital signal traffic upstream in the network runs only via second signal path 45 provides the option of arranging rectifier means 47 in the first signal path to suppress any traffic in the opposite direction in first signal path 44. The advantage hereof is that possible noise
25 generated at the user, referred to as ingress noise, no longer has the chance of reaching network 1 via this signal path 44. Used as rectifier means in this embodiment is an operational amplifier with an attenuation of more than -70 dB, which has been found in practice to be amply sufficient to suppress a significant part of ingress noise in network 1. Return path 45 on the other hand, including filter 460, has an attenuation of no more
30 than only -1 dB, so that return traffic is still possible along this side. The use of an operational amplifier 47 as rectifier means has the additional advantage the gain thereof,

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which amounts here to about 6 dB, compensates the attenuation of about 5.6 dB resulting from the splitter 48 which divides output 42 of the device into three branches. The user thus has three connections 42,42',42" at his disposal to receive downstream signal traffic from network 1. At least one of these connections 42" is insulated for direct current in that a capacitor 49 is incorporated in the signal path thereto. This connection is specifically intended for high-grade, usually (high) voltage-sensitive equipment which is thus electrically insulated from the other equipment which is coupled to another output 42,42' of unit 40, such as for instance the first telecommunication means 11,12. Connection 42" thereby provides protection against a possible overvoltage and poor earthing of this other equipment. Such a protection also applies to the input 43 of the device, since a capacitor 49 is likewise incorporated in second signal path 45.

Coupled to the thus protected input 43 and output 42" of unit 40 are second telecommunication means 21 which in this embodiment comprise conversion means in the form of a modulator-demodulator unit, referred to in short as modem, which is specifically suitable for a cable television network such as the network 1 of this embodiment. The modem is capable of a conversion of digital signals from the equipment connected thereto into signals suitable for transport in network 1, and vice versa. For receiving signal traffic from network 1, which takes place in the first frequency range, the modem 21 has an input 211 which is coupled for this purpose to the output 42" of unit 40, while return traffic in the second frequency range is supplied to an output 212 and led over the signal path 45 intended therefor via input 43 of connection unit 40. The modem is able to apply a specific modulation frequency for both routes which is adapted to separating means 460 in connection unit 40. On the other side the modem 21 has a combined digital input/output 213 for connection of digital third telecommunication means, such as the computers 31, telephones 32,33 and decoder 34 shown in this embodiment.

The connection of these third telecommunication means 31..34 takes place in this embodiment via a gateway unit 50. This gateway unit has on the one hand connections

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In order to avoid said ingress noise interfering in disturbing manner with the signal taken from another output 42,42',42'', attenuation means are arranged in this embodiment in the signal paths between individual outputs 42,42',42''. The attenuation means here comprise directional couplers 61,61',61'', each with a main path having no or

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only little attenuation of here -1 dB, and a markedly more strongly attenuated branching where the signal in this embodiment undergoes an attenuation of about -10 dB. The device comprises such an attenuator 61,61',61" for each output 42,42',42", wherein output 42,42',42" is coupled to the branching thereof. The attenuators are placed successively in a main signal path which ends in a terminator 64 which is adapted to the signal path with an impedance of 75 Ω in order to prevent reflections.

Operational amplifier 47 has an amplification of about 17 dB. This means that an input signal supplied to connection 43, assuming an attenuation of about -1 dB by duplex filter 460, arrives at the output of amplifier 47 with an amplification of 16 dB. The first directional coupler 61" provides an attenuation of -10 dB, while an additional attenuator 62 provides an additional damping of -6 dB, whereby the signal can be taken from the first output 42" at practically the input level. The attenuation in the main path of -1 dB in each case results in the signal being available at the following output 42' at a level of 5 dB and, finally, at the last output 42 at 4 dB relative to the input level. These two latter outputs can for instance be used for connection of radio, television and video equipment and, if desired, a set-top box for teleservices related thereto and the like. The output level can if desired be further adjusted by interposing an attenuator such as at the first output 42".

Although the supplied signal is thus available at each output 42,42',42", the attenuating means 61,61',61" ensure that a signal separation of at least -20 dB is present between adjacent outputs 42,42',42". Possible ingress noise and other interference from any of the outputs 42,42',42" will thereby undergo an attenuation of -20 dB in a signal path to another output and thereby be almost completely suppressed. Not only is an effective signal separation thus brought about in the present embodiment between input 43 and an output 42,42',42" of the device, but also between the outputs 42,42',42" mutually.

The first output 42" can for instance be used in combination with input 43 for connection of a personal computer, in a network or otherwise, provided with a cable modem 21. In order to shield this electronically relatively sensitive equipment, the

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connections 41,42" used for this purpose are provided with a galvanic separation in the form of a pair of capacitors 49. A high voltage coming from television equipment connected to either of the other outputs 42,42' will thereby be less easily able to reach the PC equipment.

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All in all the invention provides a very generally applicable solution for connection of all types of telecommunication equipment to a common connection 2 of a telecommunication network 1, wherein a high quality of both reception and transmission signals can be realized, mutual interference is precluded to the greatest possible extent and ingress of noise from the user into the network is suppressed to a significant degree.

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Although the invention has been further elucidated in the foregoing with reference to only a few embodiments, it will be apparent that the invention is in no way limited to the given examples. On the contrary, many variations and embodiments are still possible for the average skilled person within the scope of the invention. The gateway unit can thus be extended or restricted in accordance with the diversity of the equipment to be connected thereto. In addition, the invention is further described on the basis of a cable television network and therefore particularly applicable for that purpose, but it can nevertheless also be employed for other types of network, wherein as a result of the invention an effective separation is always possible between upstream and downstream signal traffic at the user, so that the two do not interfere with each other.

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Claims

1. Connection device for coupling first telecommunication means capable of receiving a first telecommunication signal in a first frequency range, together with second telecommunication means capable of transmitting a second telecommunication signal in a second frequency range, to a single telecommunication network connection, comprising an output for the first telecommunication means, an input for the second telecommunication means, a common network connection for the telecommunication network and separation means adapted to directing the first telecommunication signal over a first signal path between the output and the common network connection and the second telecommunication signal over a second signal path between the common network connection and the input characterized in that said signal paths are separated from each other between the separation means and the input and output respectively and in that the first signal path comprises rectifier means capable of suppressing signal transport in a direction opposite to that of the first telecommunication signal.
2. Connection device as claimed in claim 1, characterized in that the rectifier means comprise an operational amplifier.
3. Connection device as claimed in claim 1 or 2, characterized in that the separation means comprise frequency filter means adapted to directing both telecommunication signals over their respective signal paths.
4. Connection device as claimed in claim 3, characterized in that the frequency filter means comprise a low-pass filter with an edge frequency above a lower one of said first and second frequency range, as well as a high-pass filter with an edge frequency below a higher one of said first and second frequency range, while the edge frequency of the high-pass filter exceeds the edge frequency of the low-pass filter.
5. Connection device as claimed in one or more of the preceding claims, characterized in that the second telecommunication means are moreover capable of

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receiving a first telecommunication signal in a first frequency range and in that the device comprises at least one further output being intended for the second telecommunication means.

5 6. Connection device as claimed in claim 5, characterized in that attenuation means are connected between said outputs of said connection device.

7. Connection device as claimed in claim 6, characterized in that the attenuation means comprise at least one directional coupler.

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8. Connection device as claimed in claim 5, 6 or 7, characterized in that at least the output for the second telecommunication means is electrically insulated for a direct current.

15 9. Telecommunication system comprising first telecommunication means capable of receiving a first telecommunication signal in a first frequency range, second telecommunication means capable of transmitting a second telecommunication signal in a second frequency range, and a telecommunication network, characterized in that the telecommunication system comprises a connection device as claimed in one or more of
20 the preceding claims connecting the first and second telecommunication means to said network.

10. Telecommunication system as claimed in claim 9, characterized in that the telecommunication network comprises a cable television network intended for the
25 distribution of radio and/or television programmes and in that the first telecommunication means comprise a radio receiver and/or a television receiver.

11. Telecommunication system as claimed in claim 9 or 10, characterized in that the system moreover comprises digital third communication means, in that the second
30 telecommunication means comprise signal conversion means which are coupled to an input and an output of the connection device on the one hand and to said third

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telecommunication means on the other hand and in that the conversion means are capable of converting digital signals from the third telecommunication means into a communication signal compatible with the telecommunication network, and vice versa.

- 5 12. Telecommunication system as claimed in claim 11, characterized in that is comprises a gateway unit connecting the third telecommunication means to the conversion means and in that the gateway unit comprises an interface adapted to the specific type of third telecommunication means.
- 10 13. Telecommunication system as claimed in claim 12, characterized in that the gateway unit is adapted to connecting third telecommunication means taken from a group of a computer, means for analog or digital telephony and means for communication over a standard RS 232 serial port.
- 15 14. Telecommunication system as claimed in claim 12 or 13, characterized in that the gateway unit is adapted to communicating with the conversion means using a telecommunication protocol which allows the integration of different telecommunication services.
- 20 15. Telecommunication system as claimed in claim 11, 12, 13 or 14, characterized in that the third telecommunication means are coupled to a digital further telecommunication network, which further network is coupled to the input and output of the connection device via said conversion means.
- 25 16. Telecommunication system as claimed in claim 15, characterized in that the further network supports an integration of several telecommunication services.
17. Telecommunication system as claimed in claim 16, characterized in that said further network supports data traffic as well as telephony.

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A telecommunication system comprising first telecommunication means (11, 12) capable of receiving a first telecommunication signal in a first frequency range and second telecommunication means (21) capable of transmitting a second telecommunication signal in a second frequency range, and a telecommunication network (1). The first and second telecommunication means (11, 12, 21) are coupled to the telecommunication network (1) via the connection device (40). The connection device (40) comprises separate signal paths (44, 45) to an input (43) and an output (42) thereof, which are coupled to a common connection (41) intended for the telecommunication network (1) via separation means (460). The first telecommunication means (11, 12) are herein coupled to the output (42), while the second telecommunication means (21) are connected to the input (43). The separation means (460) are herein capable of leading the first telecommunication signal at least almost exclusively over a first signal path (44) between the output (42) and the common connection (41) and the second telecommunication signal at least almost exclusively over a second signal path (45) between the common connection (41) and the input (43).

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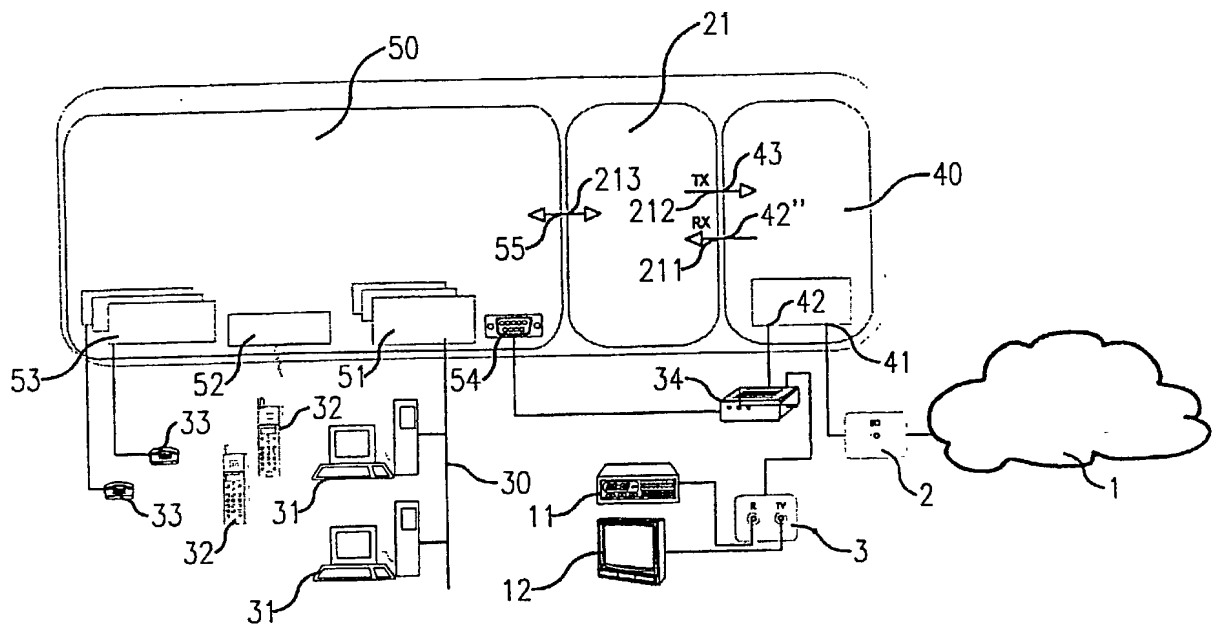


Fig.1

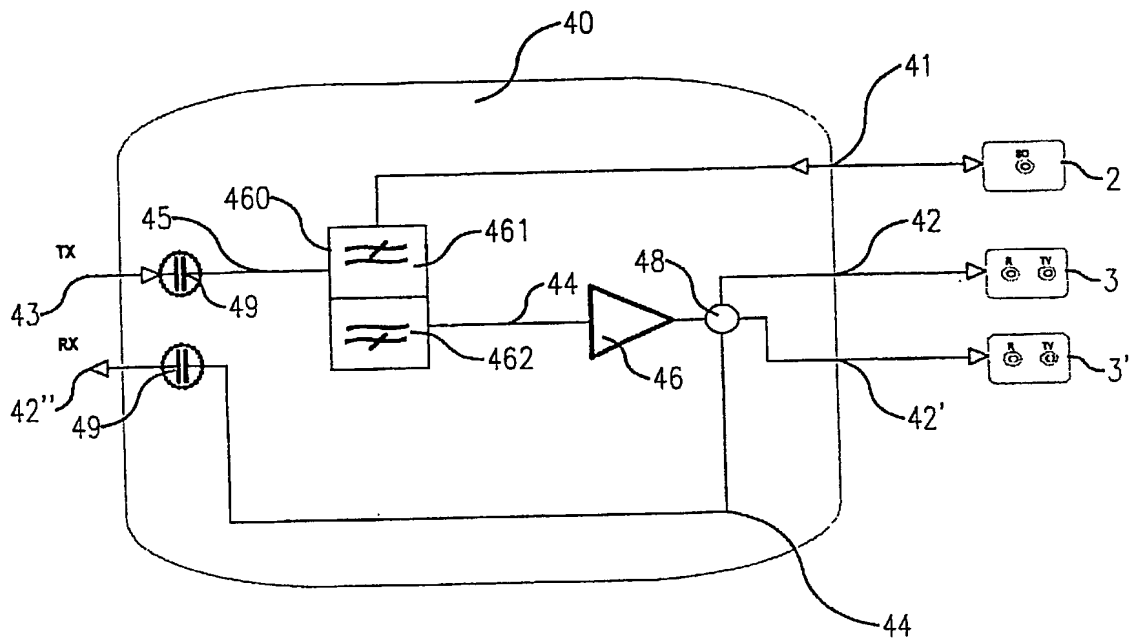


Fig.2

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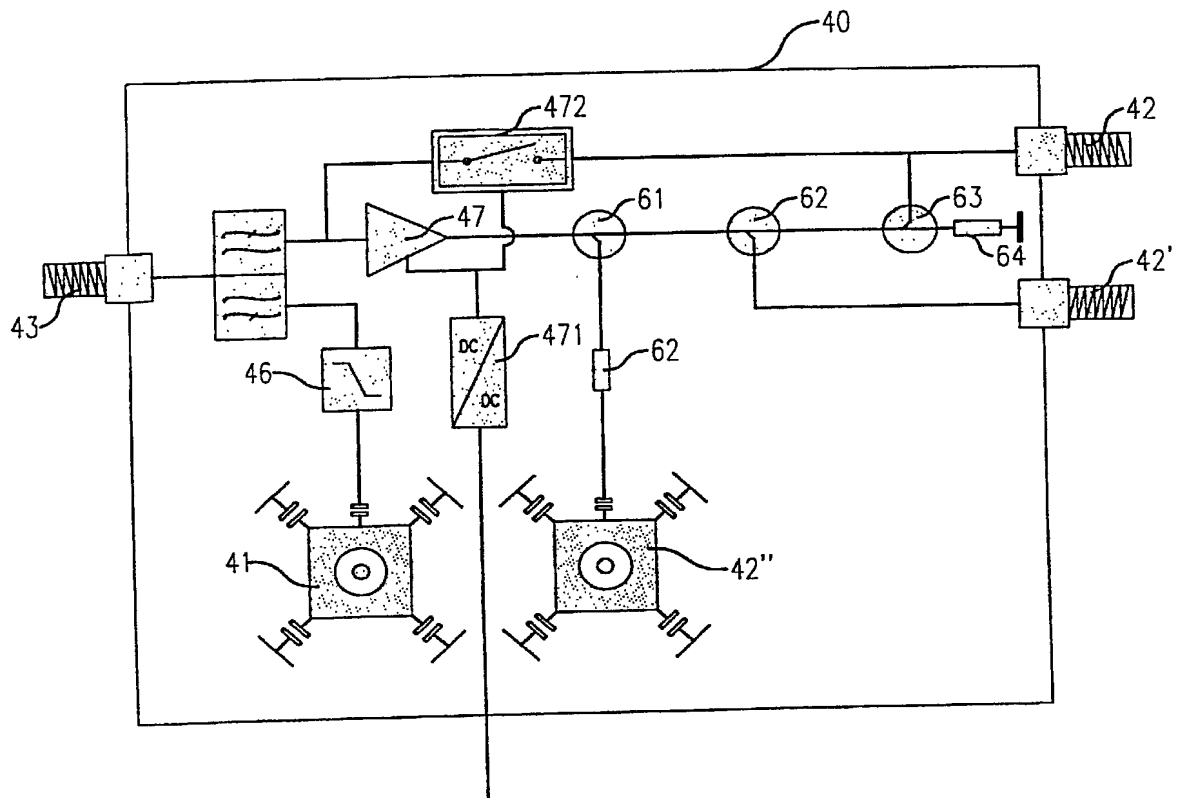


Fig.3

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TELECOMMUNICATION SYSTEM AND CONNECTION DEVICE FOR USE IN IT

the specification of which: *(check one)*

REGULAR OR DESIGN APPLICATION

☐ is attached hereto.

☒ was filed on June 11, 2001 as application Serial No. _____ and
was amended on _____ (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

☒ was described and claimed in International application No. PCT/NL99/00756 filed
on December 9, 1999 and as amended on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

PRIORITY CLAIM

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)

Country	Application Number	Date of Filing (day, month, year)	Priority Claimed
THE NETHERLANDS	1010769	9 DECEMBER 1998 (09.12.98)	YES

(Complete this part only if this is a continuing application.)

I hereby claim the benefit under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)

(Filing Date)

(Status--patented, pending, abandoned)

POWER OF ATTORNEY

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from Octrooibureau LIOC as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

As a named inventor, I hereby appoint the registered patent attorneys represented by Customer No. 000466 to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, including: **Robert J. PATCH, Reg. No. 17,355, Andrew J. PATCH, Reg. No. 32,925, Robert F. HARGEST, Reg. No. 25,590, Benoît CASTEL, Reg. No. 35,041, Eric JENSEN, Reg. No. 37,855, Thomas W. PERKINS, Reg. No. 33,027, and Roland E. LONG, Jr., Reg. No. 41,949,**

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Date

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